Advanced Technology

SPAWAR

INFORMATION   SOLUTIONS

Industry Brief

26 JUNE 1997

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Advanced Technology Panel

- **CARL ANDRIANI** — **Director, Advance Technology and Prototype System Directorate, SPAWAR**

- **DON BAILEY** — **Executive Director, NISE East**

- **STEVE ARKIN** — **Deputy Executive Director, Science, Technolgy & Engineering, NRaD**

- **CAPT LEE DICK** — **Program Manager, Warfare Analysis Modeling & Simulation Division, SPAWAR**

- **PHIL ANDREWS** — **Program Manager, Technology & Prototype Development Division, SPAWAR**

Outline

- **OVERVIEW**   **CARL ANDRIANI**

- **M&S OVERVIEW**   **CAPT LEE DICK**

- **TECH OVERVIEW**   **PHIL ANDREWS**

  STEVE ARKIN

  DON BAILEY

- **PANEL DISCUSSION**

Advanced Technology Mission

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Supports the SPAWAR Mission to deliver supported, affordable, integrated and interoperable world class information solutions to warriors and supporting elements through:

- The infusion of advanced technology
- Development of joint interoperable M & S products
- Fleet introduction/demonstration of advanced technologies and M&S products in joint exercises.

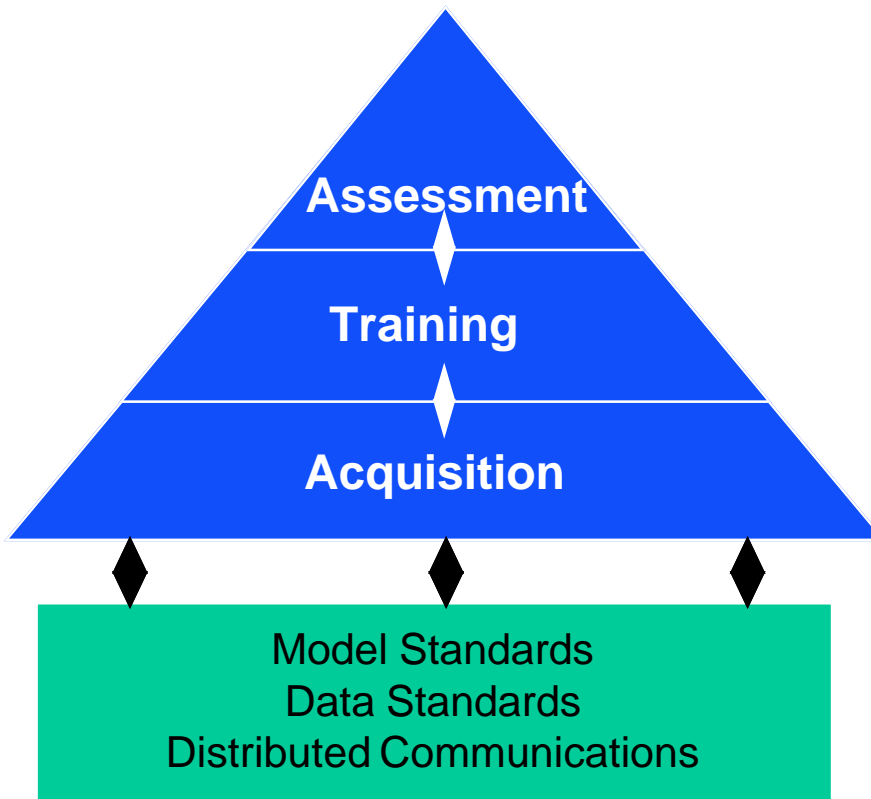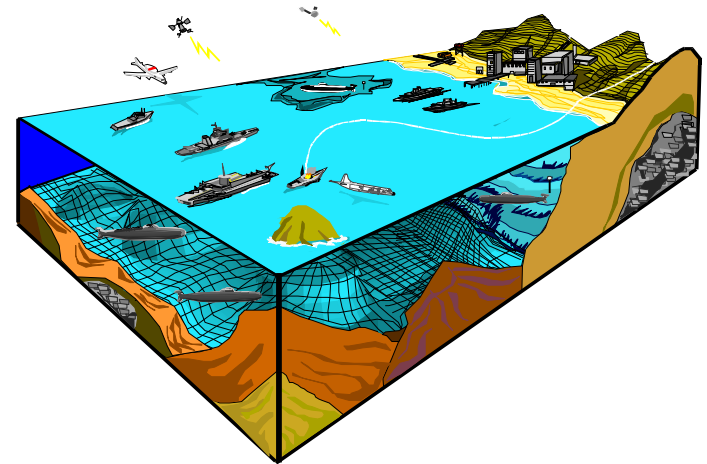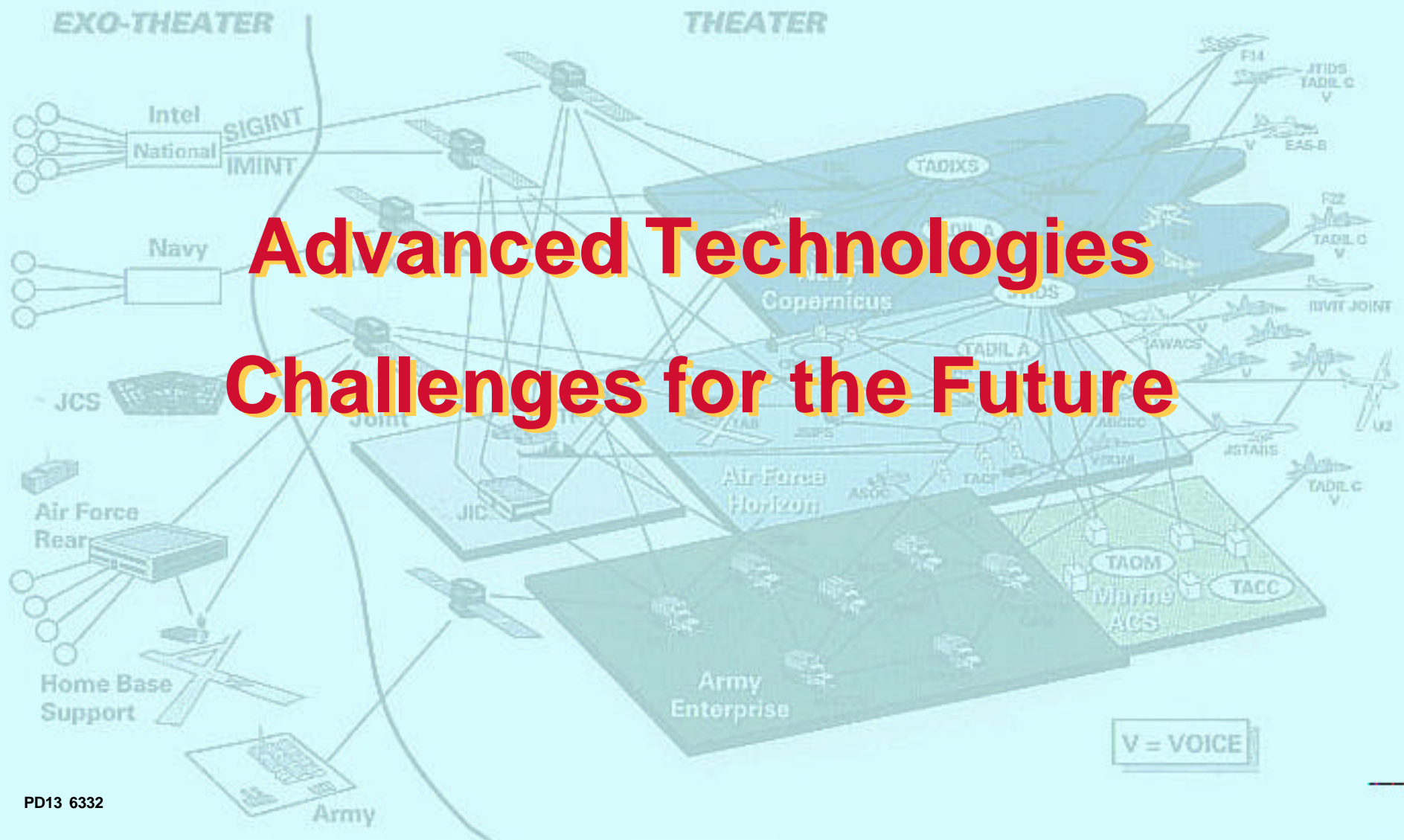# Modeling and Simulation Challenges for the Future

Future Vision

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Synthetic Battlespace

Assessment

Training

Acquisition

=

Model Standards
Data Standards
Distributed Communications

Advanced Technologies
Challenges for the Future

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Advanced Technology & Prototyping

Command & Control

Computers

Displays

Collaborative Planning

Human User Interfaces

Consistent Situation Perception

ISR

Synchronized Execution

Supportability

Infrastructure

Dynamic Interoperable Connectivity

Security
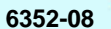
Interoperability

Communications

What Will Be Covered

- **M&S / Technolgy Problems**

- **M&S / Technolgy Efforts**

- **Resources and Facilities**
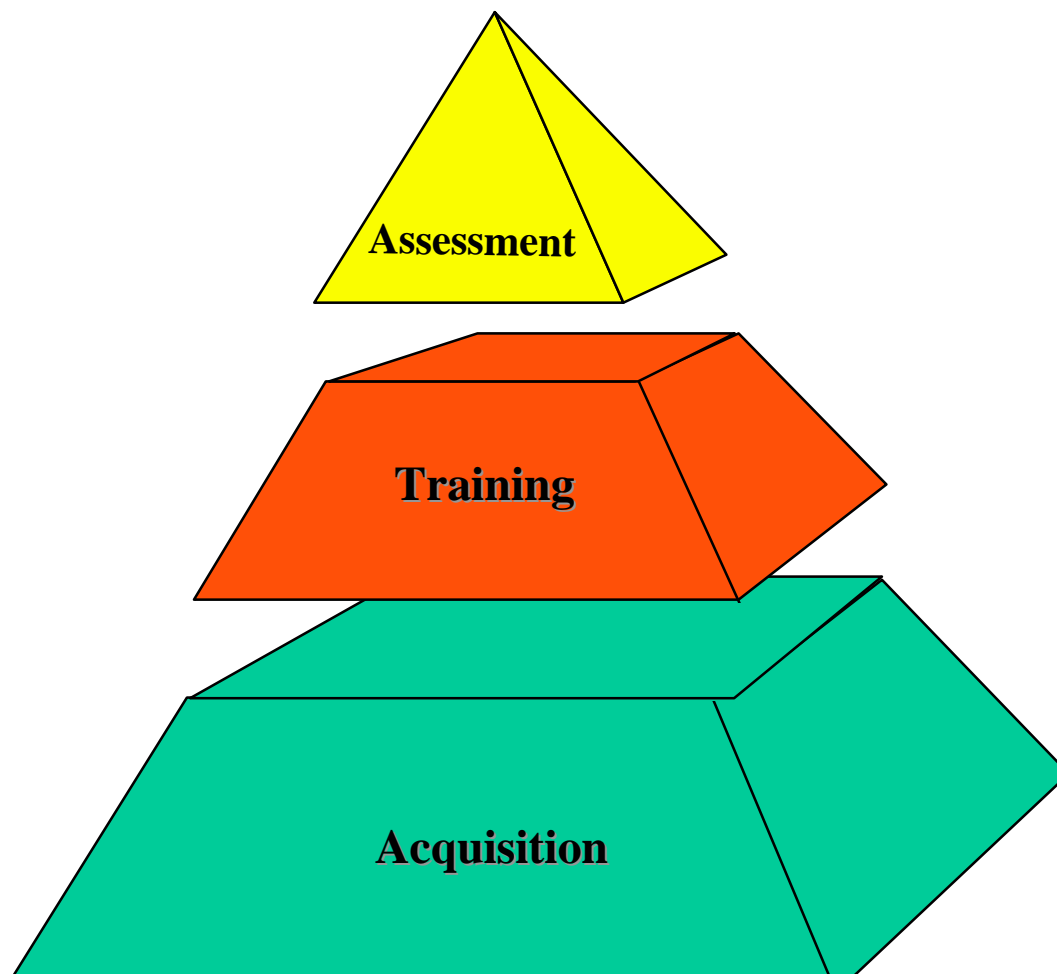
- **Industry Opportunities**

- **Points of Contact**

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Advanced Technologies Challenges for the Future

CAPT LEE DICK

PD13 6332

Modeling and Simulation Challenges for the Future

M&S Vision

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Operational Employment

Warfare Analyses

Training & Rehearsal

Research & Development

Test & Evaluation

Acquisition

Assessment

Training

Acquisition

Model Standards
Data Standards
Distributed Communications
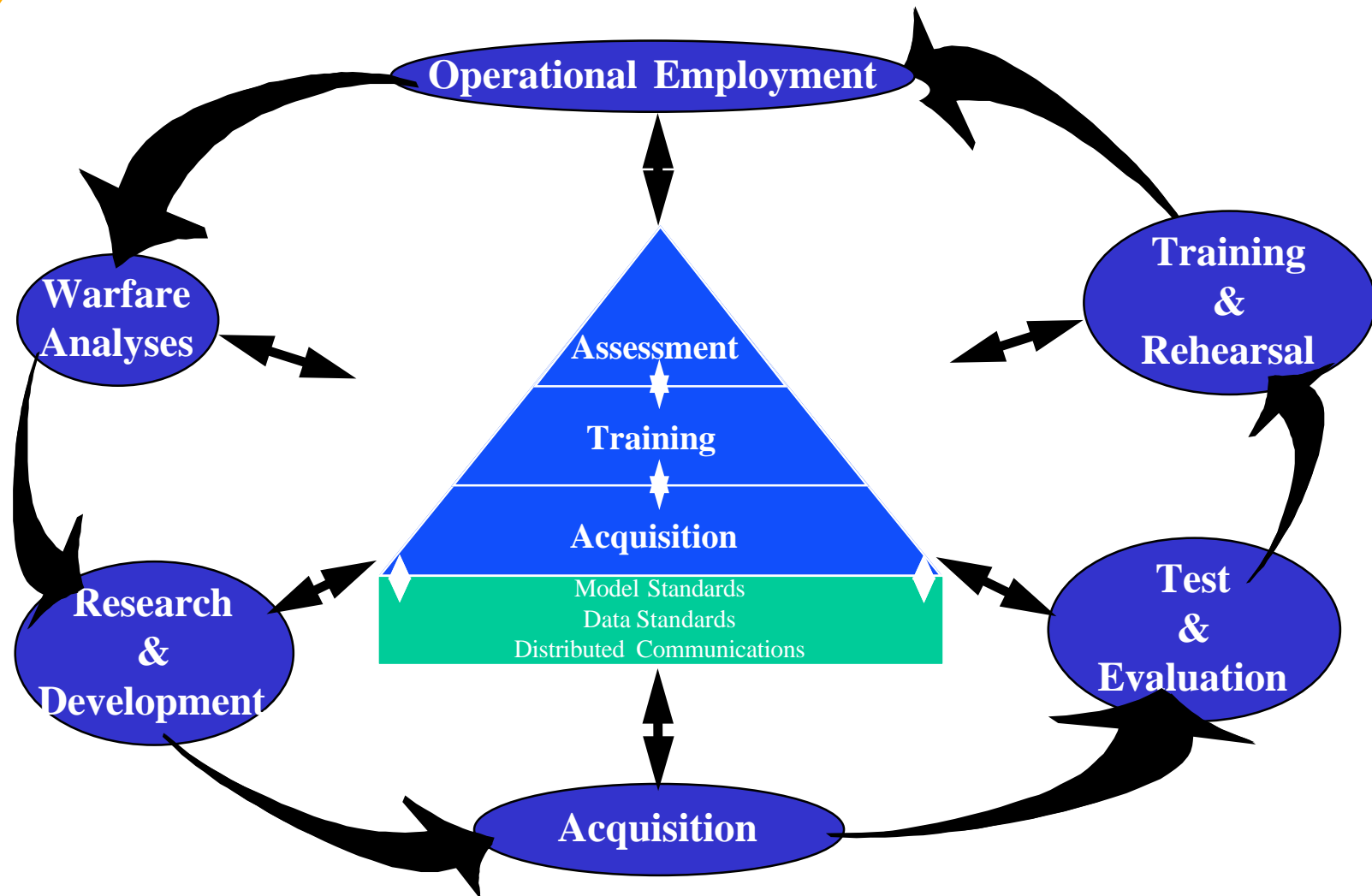
M & S Roadmaps

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Assessment
Better Decisions

- JAMIP
- GCAM
- NSS
- JWARS

Training
Improved Warfighting Skills

- JTC
- MODSAF
- ENWGS
- BFTT
- JTCTS
- JSIMS

Acquisition
Reduced Cycle Time & Cost
Optimized Systems

- CAD/CAM
- DSBA
- PILOT PROGRAMS
- CVP
- JMASS

The Assessment Question:
Better Decisions

JWARS: HOW MANY TANK COMPANIES SHOULD WE HAVE IN 2015?

Model: Must be or appear to be deterministic.

Challenges: How to construct deterministic models?
How to solve the sampling problem of multiple scenarios in the context of this question?
Multiple runs /high computational power

Scenario: Point estimates are probably counterproductive

Enemy: Optimized or satisfied (whatever that means)

The Training Question:
Improved Warfighting Skills

JSIMS: HOW DO WE TRAIN A TANK COMPANY COMMANDER?

Model : Generally man in the loop and stochastic with varying degrees of resolution and aggregation

Challenge: How do we simulate complex adaptive behaviors?

Distributed training demands high bandwidth via multiple MLS paths

Scenario: Point estimates are essential.

Enemy: Sampled from a real distribution

The Acquisition Question:
Reduced Cycle Time & Cost; Optimized Systems

JMASS: What should the distribution of armor be on a tank in 2015?

Model: Physics based not even a simulation (collaborative whiteboarding)

Challenge: How to deaggregate engineering design objects to lower resolution training and assessment objects without losing accuracy.
High bandwidth requirements for distributed, collaborative design

Scenario: Context more important than details.

Enemy: Details probably unimportant maybe irrelevant.

Opportunites Abound

High Performance tactical computers which will support multiple processors on the same backplane

- – Multiple simulations on same processor
- – Operational and Simulated applications on same processor
- – Tenfold increase of current TAC 4 processing needed to turn around multiple iterations of a force level analysis within 30 min

More Opportunites

"Smart" processors to reduce manpower requirements to setup/run large simulations

– JSIMS goal is to 2/3 manpower reduction over current federation

Web Browser technology to enable multiple users to access simulations on High Performance Computers

– Browsers must be capable of handling dynamic information/data

More Opportunites

3-D Virtual Imersion with voice recognition

Intelligent model trainers & improved HCI to reduce time/cost to train users

– Order of magnitude reduction

Because of proprietary information within the acquisition process, true sharing of models and data does not, and cannot, occur.

– Can industry force paradigm change on DOD?

More Opportunites

Help implement HLA standards across both service and industry

- –Significantly reduces 'entity' problem since all info is not passed to everyone but only what is needed
- –Need method to integrate models of complimenting expertise without having to generate a new model (reuse)
- –Need Industry to adopt HLA standards

Summary:
M&S Challenges for the Future

- A growing area for both DoD and Industry

- Industry successes leading the way and influencing DoD

- Fast technology changes forces DoD to COTS

- Hardware capabilities increasing/costs decreasing

**"More Bytes For Your Buck" instead of
"More Bang For Your Buck"**

Advanced Technologies Challenges for the Future

PHIL ANDREWS

Technolgy Strategy

Advanced Development Core Technology Program
- **Vehicle for Developing Technology Solutions in C4ISR**

- Tech Works

  - Vehicle for Developing New System Engineering

    Process and Seamless Technology Insertion

- Sea Based Battle Lab (3Rd Flt - USS CORONADO)

  - Supports Dod/Don RDT&E, and Accelerates

    Product Development and Acquisition Cycles

Technolgy Strategy (Cont'd)

- **Maritime Battle Center-Virtual Environment**
  - **Means to Address Interoperability, Reconfigurable Connectivity, Etc.**

- Joint Warrior Interoperability Demonstration (JWID)

  - Joint/Coalition Demo and Assessment of C4ISR

    Systems/Technologies

- AUS CAN NZ UK US

  - Operational Tests to Identify Coalition C4ISR

    issues

- Variety of Technology Prototyping and Demonstration

  Opportunities

Statement of Problem

- **Declining Navy S&T Investment**

- **Considerable C4ISR Investment by Industry**

- **Need to Assess & Prioritize All C4ISR Technologies (Navy & Industry)**

- **Tailor Navy S&T Investment to Ensure Highest Payoff**

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Statement of Problem (Cont'd)

- **Re-Engineer Systems Process to Incorporate New Technologies Into Legacy Systems**

- **Create a Technology "Plug-N-Play" Architecture WhereTechnologies From COTS Can Be Inserted.**

- **Use Industry Models Where Appropriate**

- **New Systems Engineering Process**

- **Life-Cycle Supportability Models**

Technology Thrusts

- **Topside**

  Integrated Topside Design Including Embedded Antennas, Multi-Functional Apertures, Reduced Signatures

- **Tools**

  Aids For System Development, Evaluation, Verification
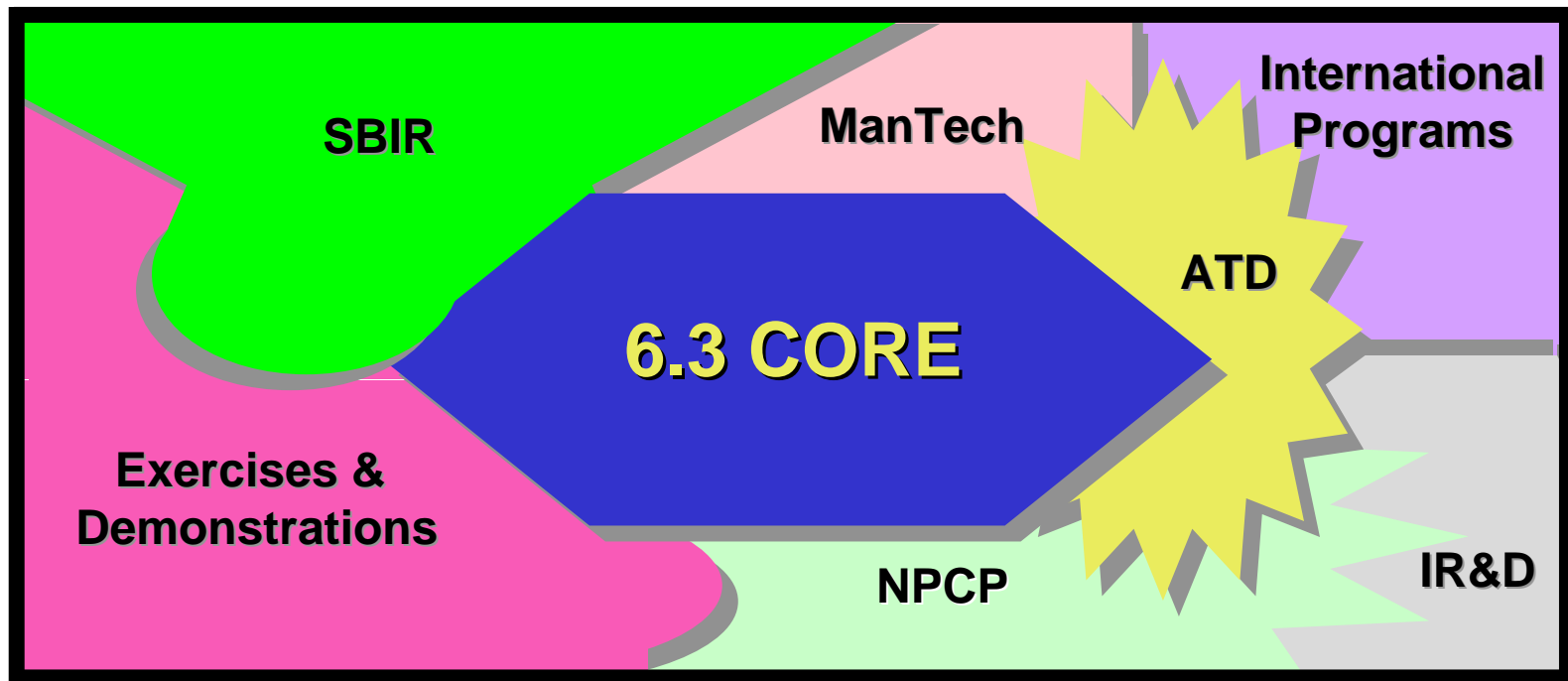
- **Prototyping**

  Vehicle for Rapid Demonstration of Mature Technologies

- **Techworks**

  New System Engineering Process Is Required to Effectively and Efficiently Transition High Payoff Technologies for the Warfighter

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How can Industry help?
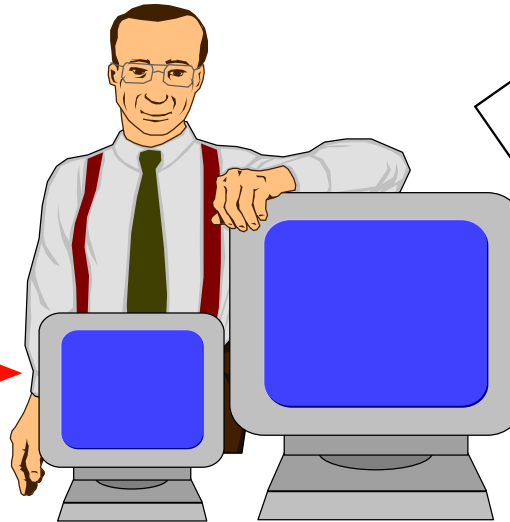
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ATD
- High Risk
- High Payoff
- Solutions

Demonstrations of COTS Products

Provide your good ideas. Help us reinvent the future as we reengineer our SE process

Increase communication through IR&D Technical Interchange Meetings and Industry Days

SBIR
- Innovative
- Transitionable
- Dual Use

MANTECH
- Cost Reduction
- Design for Producibility

NPCP
- Ideas
- Analysis
- Evaluations

Summary

- Focus Corporate Efforts & Needs Toward Navy Direction

- Manage Core Technology Developments

- Prototype and Evaluate Near Term Solutions

- Facilitate:
    - Insertion of COTS/GOTS/NDI Into Product Lines
    - Influence "COTS of the Future" Through IRAD/NPCP
    - Manage High Risk Innovative (SBIR/ATD) Process

- Formulate New System Level Approaches for System of the Future

- Incorporate S&T Into Acquisition Process

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Challenges for the Future

STEVE ARKIN

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Outline

- **S&T Planning**
- **Industry Opportunities**
- **Resources and Facilities**
- **Technology Areas**

S&T Planning

- **Select Technical Focus Areas**
- **Be Responsive to End Users**
- **Use Existing Technologies**
- **Involve Industry Early**

Industry Opportunities

- **Navy Potential Contractor Prog.**
- **SBIRs and CRADAs**
- **ATDs and ACTDs**
- **Innovative Teaming (CA, OTA)**

Resources and Facilities

- **Technical Expertise**
- **Specialized Capabilities**
  - **Distributed test beds**
  - **High performance computing**
  - **Information transfer**
  - **C4I & surveillance facilities**

Technology Areas

- **Ocean & Littoral Surveillance**
- **Microelectronics**
- **Communications & Networking**
- **Topside Design/Antennas**
- **Command Systems**
- **Computer Technology**

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Technology Areas Cont.

- **Navigation & Aircraft C3**
- **Intell./Surv./Recon. Sensors**
- **Atmospheric Effects Assess.**
- **Marine Mammals**
- **Environ. Quality Assessment**

Advanced Technologies Challenges for the Future

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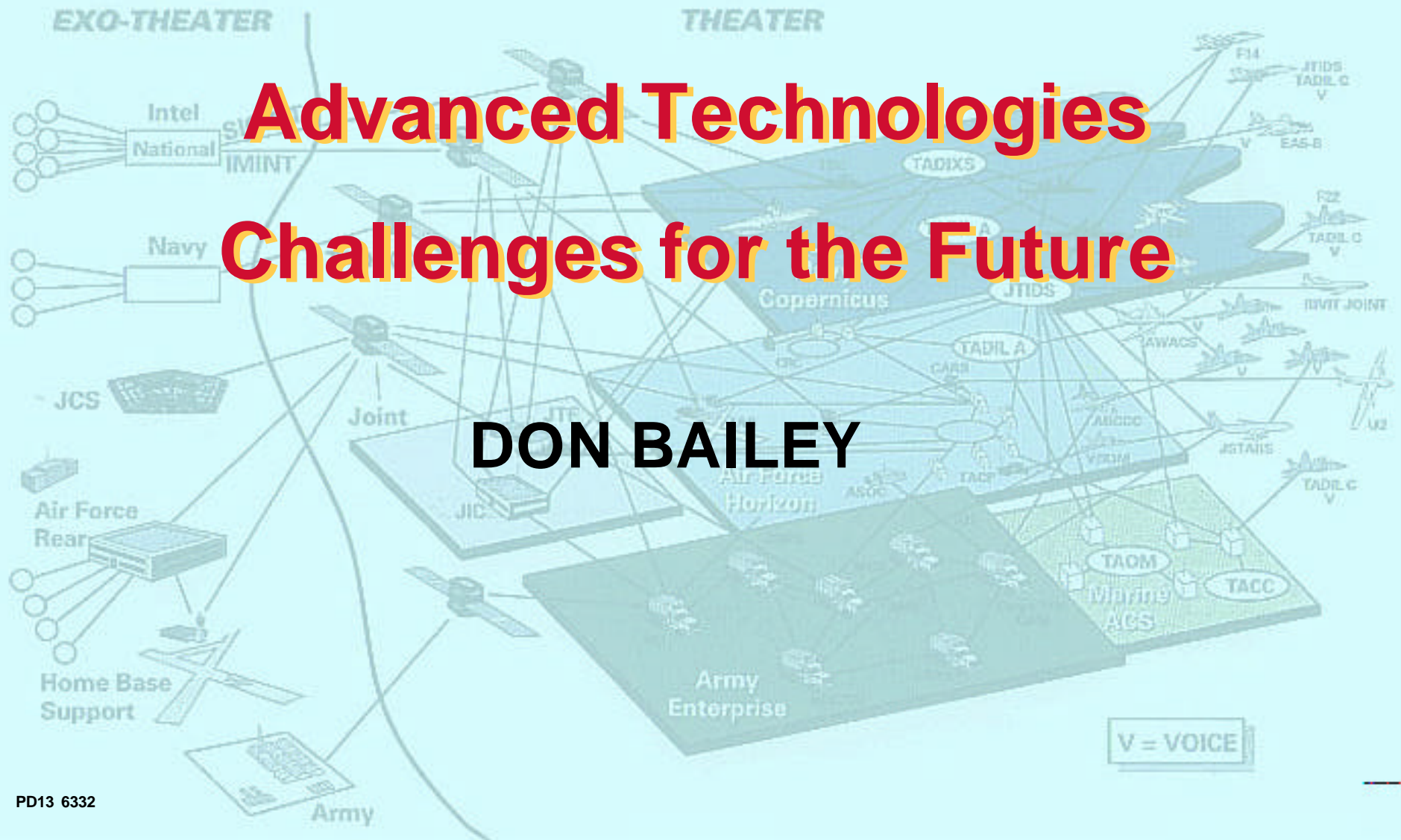
Technical Efforts

- **Support of National Institute of Justice efforts**

- **Support of DARPA programs in physical security**

Technical Efforts (Cont'd)

- **Development of virtual lab network to support Maritime Battle Center modeling and simulation efforts**

Technical Efforts (Cont'd)

- **Infusion of latest technology in existing or new C⁴ISR systems**

- **Support of National Science Foundation in Antarctic**

Technical Efforts (Cont'd)

- **Support of Special Forces technology efforts**

Points of Contact

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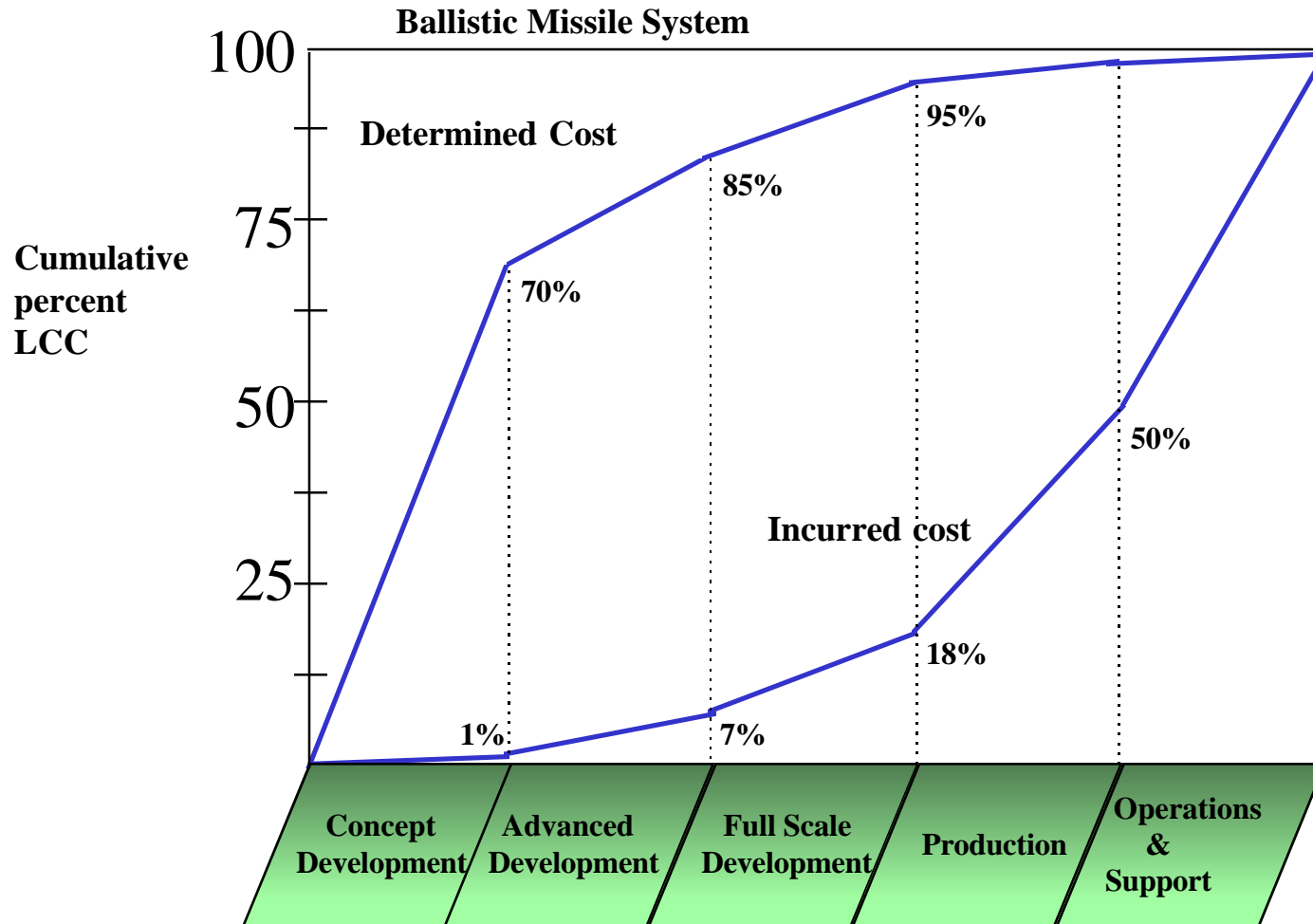**(NISE EAST) Ann Howell, 803-974-5115**

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BACKUPS

Affordability Through Technology Acquisition Acceleration

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Science & Technology

Acquisition

Advocates Users

"The Fleet"

Serial, expensive, time consuming
"The way we've always done it."

ACTDs - Shorter, less expensive.
Tradeoff Logistics, Training,
Documentation, Certification & ilities.

Acquisition Acceleration
Parallel Process
Faster, Less Expensive
"Concurrent Engineering"

"Working Together Essential for Success"

Time to IOC

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Technology Strategy

Technology, Prototyping and Demonstration Vehicles for Quick Introduction Into Product Lines/Fleet

- **Advanced Development Core Technology Program**
  - Vehicle for Developing Technology Solutions in C4ISR
- **Tech Works**
  - Vehicle for Rapid Prototyping and Test of Problem Solutions and High Payoff Innovations
- **Sea Based Battle Lab (3rd Flt - USS CORONADO)**
  - Supports DoD/DoN RDT&E, and Accelerates Product Development and Acquisition Cycles
- **Maritime Battle Center-Virtual Environment**
  - Means to Address Interoperability, C4ISR Reconfigurable Connectivity, etc.
- **Joint Warrior Interoperability Demonstration (JWID)**
  - Joint/Coalition Demo and Assessment of C4ISR Systems/Technologies
- **AUS CAN NZ UK US**
  - Operational Tests to Identify Coalition C4ISR Problems
- **Variety of Tech Prototyping and Demo Opportunities**

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Current Programs

JPP/RTS

Provides Collaborative Strike Force Planning and Mission Execution for Joint Service Systems

PDE

Develop, Obtain, Demonstrate, Evaluate, and Transition Softwar Programmable Engines Based on Open Architectures Which Can Create Waveforms for Comms/Radar/IW Applications

TECHWORKS

Dedicated to Using the Principles, Policies and Procedures of Acquisition Reform to Develop a New System Engineering Process That Focuses on Functional Decomposition/Aggregation and Speeds the Identification, Development and Fielding of Advanced Technologies to Naval Forces at Reduced Cost, Schedule and Complexity

SC-21

Key Phased Array Technology Development for UHF, INMARSAT EHF and GBS Functions. We Are Also Participating in Multi Function Aperture Concept Exploration Involving Radar/Comm and Dual Comm Functions.

MERS

Develop a Lightweight, Low Signature (RCS) Antenna That Integrates the Functions of the Existing UHF LOS Communications, JTIDS, Combat DF, and IFF Antennas

Current Programs (Cont.)

LOSTACK

Demonstrate a lightweight, low observable (RCS & IR) multi-function stack (Exhaust Uptakes & SATCOM Antennas)

ATD

System to perform real-time, automated, audio signal detection, classification, sorting (by speaker, language, or platform), routing and prioritization to improve situational awareness and target selection

STSR

Prototype software Toolset to create high quality specifications needed to develop high-endurance mission critical systems

MLS

Improve security in DoD's information systems, with particular emphasis on distributed C4I systems and utilization of emerging COTS/GOTS technologies

IR&D

Vigorous and continual participation in IR&D reviews will result in COTS products of the future embedded into Navy systems

Technology Challenges for the Future

- Programmable Digital Electronics - Comms/IW/SONAR/RADAR/Weapons

- Multi-Level Security and Associated Privacy Issues

- Real Time, Secure, Distributed Data Bases

- Dynamically Reconfigure System "On the Fly"

- Communications Improvements

- 10X - 100X Increase in Computational Power

- "Knowledge Engineer" Information for Decision Maker

- High Resolution (5K X 5K Pixels), 4 Dimension Display

- True System Engineering Process

- Open Systems Architecture and Acquisition

- Interoperability from within Navy Through Coalition

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